Connection between Mantle and Carbon Cycle Uncovered

Scientific Achievement

Discovered a link between deep-earth carbon reservoirs and the oxidation state of iron in mid-ocean ridge basalts

Significance and Impact

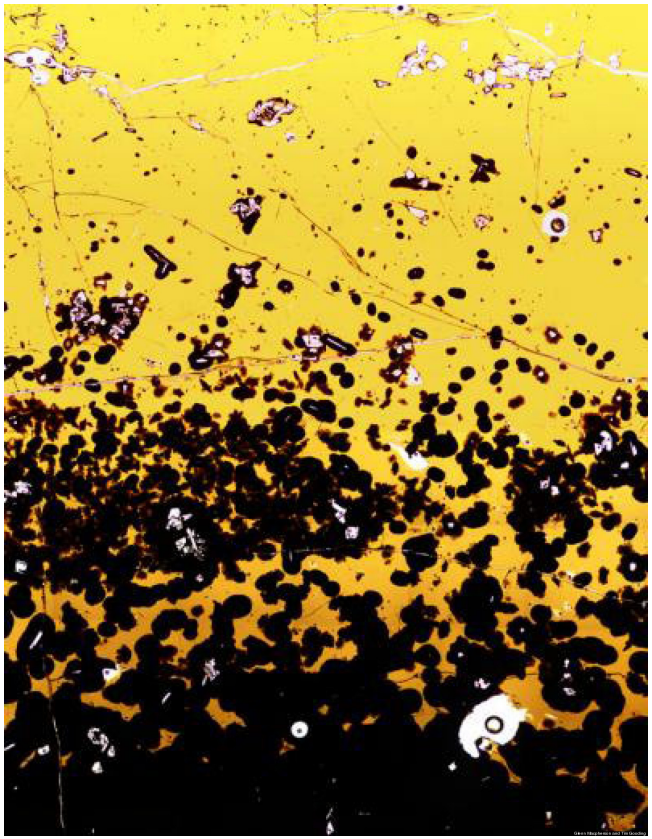
Showed that the oxidation state of iron in lava varies systematically from place to place around the globe

Research Details

- Scientists had previously thought that rare elements, such as barium, thorium, and lanthanum, were present at higher concentrations in oxidized volcanic glass.
- Now, researchers have discovered that rare elements are, in fact, present in relatively reduced volcanic glass.
- Their findings show that carbon stored for billions of years in the depths of earth may be acting to reduce the oxidation states of the iron.

E Cottrell, K Kelley, *Science* 340 (6138): 1314-1317 (2013)

Work was performed at Brookhaven National Laboratory



Polished thin section (70 micrometers) of volcanic glass, sample catalog number NMH115296-3, in transmitted light (114 by 18 millimeters). Volcanic lava erupted onto the seafloor freezes to glass and conceals clues about its origins in the depths of Earth.